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ing the last score of years, as will appear from an outline of the chief topics. Thus we have young rivers, with lakes, falls and rapids as marks of immaturity; graded rivers and the development of valleys; meanders and the shifting of divides; mature and old rivers; revived, antecedent, engrafted and dismembered rivers, the causal or historical notion appearing at every stage of the discussion.

The general reader who desires to cultivate an appreciation for natural scenery will find help in Professor Davis's volume, and the student to whom most of the materials are familiar will find a convenient and systematic summary of the important facts and doctrines of a great and growing science.

ALBERT PERRY BRIGHAM.

COLGATE UNIVERSITY, February, 1899.

GENERAL.

The Bulletin of the American Mathematical Society states that advices from the Vatican announce that Abbé Cozza Luzzi, assistant librarian, has found Galileo's original manuscript treatise on the tides. The manuscript is in Galileo's handwriting and concludes with the words: 'Written in Rome in the Medici Gardens on January 8, 1616.' The currently accepted text, the original of which was supposed to have been lost, differs considerably from that of the manuscript just found. Pope Leo XIII. has taken the greatest interest in the discovery and has ordered the manuscript to be published in an elegant edition at the expense of the Vatican.

THE London *Times* announces that it will prepare a supplementary volume to the ninth edition of the *Encyclopædia Britannica*. This edition was published between 1875 and 1889. It is well known that the treatment of scientific subjects are in many cases the best accessible to English students, being prepared by leading English men of science. It is unfortunate that a new edition of the *Encyclopædia* cannot be prepared, as the last twenty-five years have brought many changes in all the sciences, but a supplementary volume will be of some service.

BOOKS RECEIVED.

A Handbook of Medical Climatology. S. EDWIN SOLLY. Philadelphia and New York. 1897. Pp. xii + 470.

Minerals in Rock Sections. LEA MCILVAINE LUQUER. New York, D. Van Nostrand Co. Pp. vii + 117.

Die Medial-Fernrohre. L. SCHUPMANN. Leipzig, Tuebner. 1899. Pp. iv + 145. Mark 4.80.

Die Lehre vom Organismus und ihre Beziehung zur Sozialwissenschaft. OSCAR HERTWIG. Jena, Fischer. 1899. Pp. 36. Mark 1.

Regeneration und Entwicklung. H. STRASSER. Jena, Fischer. 1899. Pp. 29. Mark 1.

Elementary Physiology. BENJAMIN MOORE. New York, London and Bombay, Longmans, Green & Co. 1899. Pp. ii + 295.

Primer of Geometry. JAMES SUTHERLAND. London, New York and Bombay. 1898. Pp. 117.

SOCIETIES AND ACADEMIES.

THE GEOLOGICAL CLUB OF THE UNIVERSITY OF MINNESOTA.

At a meeting of the Club on February 25th Professor C. W. Hall discussed the extent and distribution of the Archean in Minnesota. First, accepting the Archean as that original 'crust,' or solidified portion of the earth, which is postulated in every existing view of the beginning of the geological record, he defined it as an era of igneous origins whose rocks represent the original crystallization of earth matter added to from below by successive solidification and many subsequent intrusions. By this definition all overlying clastics or irruptions into or through the clastics are excluded from the Archean. If the base of the clastics can be found there certainly should be found, locally, at least, the rocks upon which they lie. Such underlying rocks, the Archean, are believed to occur in Minnesota in two quite separated districts, the northern and the southwestern.

Along the international boundary most geologists have grouped all the rocks from Basswood Lake to Lake of the Woods as Archean, even when clastics have been clearly recognized and eruptives found breaking through them. Lack of care in delimiting the Archean upwards has caused much confusion. Lawson set an example in distinguishing between clastics, 'agglomerate schists' and the rocks underlying, though not necessarily those from which the clastics are derived. Structurally the

Archean of the Lake of the Woods forms a series of troughs—four is the number given—in which the Keewatin schists now lie. [Compare Geol. and Nat. Hist. Sur., Canada, N. Ser., Vol. I., 1885, C. C., pp. 10 et seq.] Although there are no sharp unconformities to be seen, yet, as Lawson observes, “the fact that we find in the Keewatin series the first undoubted evidences for this region of aqueous sedimentation and also of volcanic action, while in the underlying Laurentian gneiss of the region we find evidence of neither, more than suggests that the Keewatin series had a totally different kind of origin from that of the gneisses and must, therefore, be in unconformable relation to them” [Ibid., p. 84].

At Rainy Lake H. V. Winchell and Grant found a series of granites and granite gneisses beneath the other rocks (*i. e.*, Archean) and eruptive into them. Since these authors did not think best to distinguish between underlying and eruptive granite rocks their work is of but little taxonomic value. [Geol. and Nat. Hist. Surv., Minn., 23d An. Rep., 1895, p. 53.]

Between Rainy Lake and Lake Superior there are several belts of schists with alternating granites and other rocks having a general northeast-and-southwest trend. Concerning one of these, Irving noted in 1886 “that we have among the rocks * * * two types, in one of which the crystalline structure is complete and in which there is little or none of an original fragmental structure, while in the other the fragmental texture is still distinct and the alteration has progressed to a smaller degree.” He then adds “that the supposed older one of the two groups of schists in the Vermilion Lake belt is intricately penetrated by the granites of the great areas north and south of the belt.” [7th An. Rep. Director U. S. Geol. Sur., 1885–86, p. 437.] Hence areas of Archean lie north and south of these older schists.

In the Minnesota River Valley lies the most carefully studied series of granite gneisses, gneisses and gabbro schists of the State. These rocks occur quite continuously from New Ulm to Ortonville and beneath the glacial drift stretch westward into South Dakota and disappear beneath the Dakota sandstone. At New

Ulm they clearly underlie a quartzite conglomerate regarded as Huronian (whether lower or upper is not determined). This Archean series is divided, for purposes of study, into a lower and upper; the former is named the Ortonville group of augite, hornblende and biotite granite-gneisses, and the latter the Granite Falls group of hornblende and biotite gneisses and associated gabbro schists. [Hall, Syllabus of Geology, 1897, p. 83.]

F. W. SARDESON,
Secretary.

THE BOTANICAL CLUB OF THE UNIVERSITY OF CHICAGO.

At a recent meeting of the Club, Dr. Otis W. Caldwell gave the results of his study of *Lemna minor*. The following is an abstract of his paper: Owing to the greatly reduced body of the sporophyte of the Lemnaceæ there has been much interest in its morphology, and in the question as to the effect of the reduction upon the gametophyte. The investigations show that the sporophyte body is neither stem nor leaf, as often contended, but a shoot undifferentiated except at the basal or foot region and at the nodal region from which the root, the new shoots and the flowers arise. The root originates from a small group of hypodermal cells on the lower side of the node. The epidermis develops a temporary root sheath, while the persistent root cap is developed from the meristem, which is never many-celled and in a few cases was seen to be unicellular. Flowers are rarely formed, and frequently when they have begun to develop they are crowded out by vegetative buds which are produced in great abundance. Even when not encroached upon by vegetative shoots the flowers do not often succeed in forming seeds. The pollen grains usually become fully formed, but the structures of the ovule and embryo-sac may disorganize at any stage in their growth. Although the chief stages in ordinary embryo-sac development were found, such were shown by very few preparations; while in most of the preparations embryo-sacs were disorganizing, the disorganization first affecting the antipodals, then the polar nuclei or primary endosperm nucleus, the egg being the last to succumb to the unfavor-

able conditions. Cases were observed in which the upper polar nucleus, failing to fuse with the lower one, had proceeded unassisted to the production of endosperm. Few embryos were found.

In the young stamen but one archesporial mass appears. After this has enlarged somewhat a plate of sterilized tissue divides it into two regions, each of which is again divided in a similar manner, thus constituting the four archesporial masses of the anther. The four loculi of the anther are four parts of one sporangium, and not four sporangia, as reported usually for other spermatophytes. The primary tapetal layer is not differentiated until after the archesporium is separated into four masses. The tapetum may be derived either from the sporogenous tissue or from the adjacent sterile tissue. The cells of the tapetum frequently divide and push out into the cavity of the loculus, where they assist in nourishing the spore mother cells. Some of the latter are nourished also by other mother cells whose growth has ceased. The microspore germinates while within the sporangium. The generative cell remains closely applied to the wall of the spore for a considerable time before dividing to produce the male gametes.

The 'winter buds' seem to be summer buds which are not sufficiently vigorous to develop the necessary air spaces to keep them afloat. When conditions become favorable growth is renewed, air spaces develop in abundance, and the buds rise again to the surface.

It seems clear that *Lemna minor* has descended from terrestrial forms. The entire body of the diminutive plant, as evidenced by the disappearing root, the system for aeration, and the devices properly to relate the chloroplastids to the light, indicates attempts toward adaptation to the water habitat. It has not succeeded in working out such appropriate devices for pollination as are found in most water plants. The water environment also seems especially injurious to the embryo-sac structures of this plant, and the ease with which vegetative buds are produced, and the fact that some of these buds may serve to perpetuate the plant from year to year, reduces the necessity of seed production.

ENTOMOLOGICAL SOCIETY OF WASHINGTON.

UNDER the head of 'Short Notes and Exhibition of Specimens,' Mr. Benton stated that on January 22d he had found brood honey bees in all stages of growth and new adults, indicating egg laying the last of December. This is a very early instance.

Mr. Matthis exhibited specimens of what he takes to be *Boreus brumalis* Fitch, which he had caught upon the snow in the Rock Creek Valley after the recent blizzard. He showed for comparison specimens of a *Boreus* which he had caught last October at a high elevation on the Big Horn Mountains. This was a larger and darker form than *B. brumalis* and has not been specifically identified.

Dr. Dyar showed a blown larva of *Apatela clarescens* Gn., previously undescribed. The larva nearly resembles that of *A. hamamelis*; indeed, from the mature larva alone no constant differences can be pointed out, but Dr. Dyar has observed certain differences in the earlier stages of these larvæ, which will be more fully worked out at the next opportunity. In this connection, he also presented a list of *Apatela* by Professor A. R. Grote, with generic and subgeneric types, which had been prepared by Professor Grote on request, and which is supplemental to the monograph of the genus recently published by Smith and Dyar. Dr. Dyar stated that he was pleased with Professor Grote's erection of a subgenus for *A. funeralis*, since this was definable on larval character, as are all the other subgenera of *Apatela*, except *Tricholonche* as compared with *Lepitoreauma*.

Mr. Schwarz exhibited some very dry and hard pulp of the giant cactus, taken by Mr. Hubbard in the autumn of 1897 and containing specimens of the extraordinary Scolytid, *Cactopinus hubbardi* Schwarz. He had examined this pulp in January, 1897, and found the beetles alive, with no indication of oviposition. He moistened it somewhat at that time and showed the same beetles still alive, thus indicating that they may live in the adult condition for two years.

Mr. Howard showed a remarkably clear and beautiful photograph of *Phasgonophora sulcata* Westwood, which had been taken by Mr. M. V. Slingerland, and spoke briefly of the ad-

vantage of photography in entomological illustration, expressing the opinion that a fair photograph reproduced by the half-tone process is in many instances better than a poor drawing, but that the best photographs he had seen reproduced in this way were by no means equal to drawings made by competent artists. Such a photograph as the one exhibited, however, marks a great advance on previous efforts of the kind and would be invaluable at least as an aid to the artist, and if transferred by photography to a wood block and then handled by a competent wood engraver would obviate all necessity for drawing and would produce the most satisfactory results which could be obtained, since the slight failures in details could be easily rectified by the engraver.

Dr. Gill mentioned the resemblance of certain coleopterous larvæ to certain Trilobites, especially among the Staphylinidæ. He said he had been struck by this resemblance in a figure of a *Silpha* larva, even the antennæ resembling the antennæ of Trilobites as recently discovered by Beecher. He mentioned the figure of *Fluvicola*, an Isopod crustacean, in De Kay's volume on the 'Crustacea of New York, and Le Conte's conclusion that it was the larva of *Psephenus*, and asked for further information as to this resemblance.

Mr. Schwarz said that this wonderful resemblance extends through several families of Coleoptera. He instanced *Micropeplus* among the Staphylinidæ, a genus of Scydmanidæ figured by Meinert, various genera of Endomychidæ, groups of species in the old genus *Silpha* *Psephenus* and *Helichus* among the Elmidæ, and various genera of the Dasyllidæ and Lampyridæ. The resemblance is largely caused by the exfoliation of the sides of the body. What its function is he did not know, some of the larvæ possessing it being aquatic, some sub-aquatic and some terrestrial.

The first paper of the evening, by Dr. Dyar, was entitled 'On the Fluctuations of the Postspiracular Tubercle in Noctuid Larvæ.'

The second paper included a continuation of Mr. Hubbard's letters from the Southwest, presented with notes and comments by Mr. Schwarz. The letters read at this time related to the Colorado Desert and to Salton Lake and

its insect fauna. Some discussion ensued on the question as to whether the Colorado Desert has been occupied at any modern period by an arm of the sea, Messrs. Vaughan, Schwarz and Gill taking part.

L. O. HOWARD,
Secretary.

THE ACADEMY OF SCIENCE OF ST. LOUIS.

At the meeting of the Academy of Science of St. Louis of March 6, 1899, Professor J. H. Kinealy described some experiments on lifting water by means of compressed air, as is done by the Pohle air-lift pump, and discussed the efficiency problems of the use of apparatus of this description. Three persons were elected to active membership.

WILLIAM TRELEASE,
Recording Secretary.

DISCUSSION AND CORRESPONDENCE.

THE IMPORTANCE OF ESTABLISHING SPECIFIC PLACE-MODES.

TO THE EDITOR OF SCIENCE—*Sir*: I use the word 'place-mode' to embody a well-known idea, namely, that a species has a different *mode* (*i. e.*, a different *prevailing* condition of size, color, etc.) in different localities. The person who seeks to determine a place-mode determines the prevailing dimension of the principal measurable qualities (and practically all qualities of organisms are measurable) of a species as it occurs in the locality in question.

The importance of this work is as follows: It fixes the condition of a species in a particular locality at a particular time; it affords a base from which we may measure any change which the species has undergone in the same locality after a certain number of years. That species in nature do undergo changes within a man's lifetime is recognized by some conchologists who find that certain shells of the seashore have undergone within a half century an evident change of index (ratio of length to breadth). A case of especial interest because of the exact measurements which have been made is that of the rock crab of Plymouth, England, the frontal breadth of whose carapace has diminished year by year at a measurable rate (1 to 2 per cent. in five years), a result explained by certain